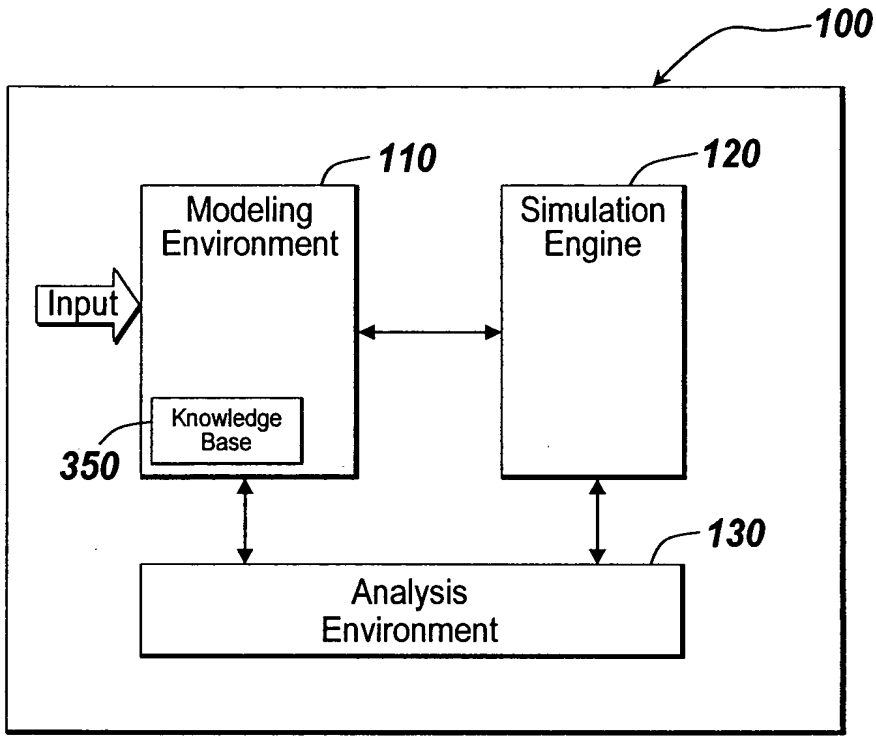
100
110
120
Modeling Environment
Simulation Engine
Input
Knowledge Base
350
130
Analysis Environment

Fig. 1

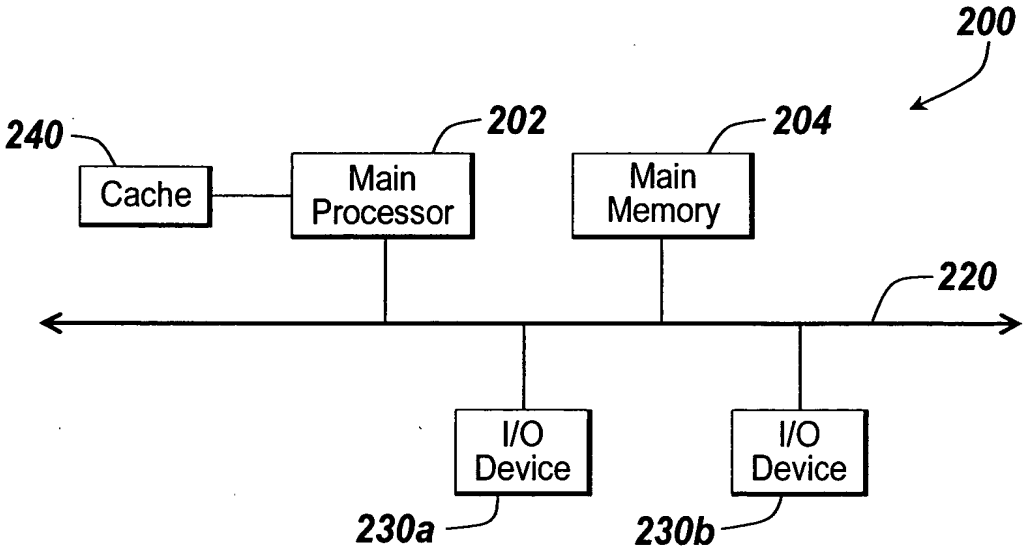
200
240
202
204
Cache
Main Processor
Main Memory
220
I/O Device
I/O Device
230a
230b

Fig. 2A

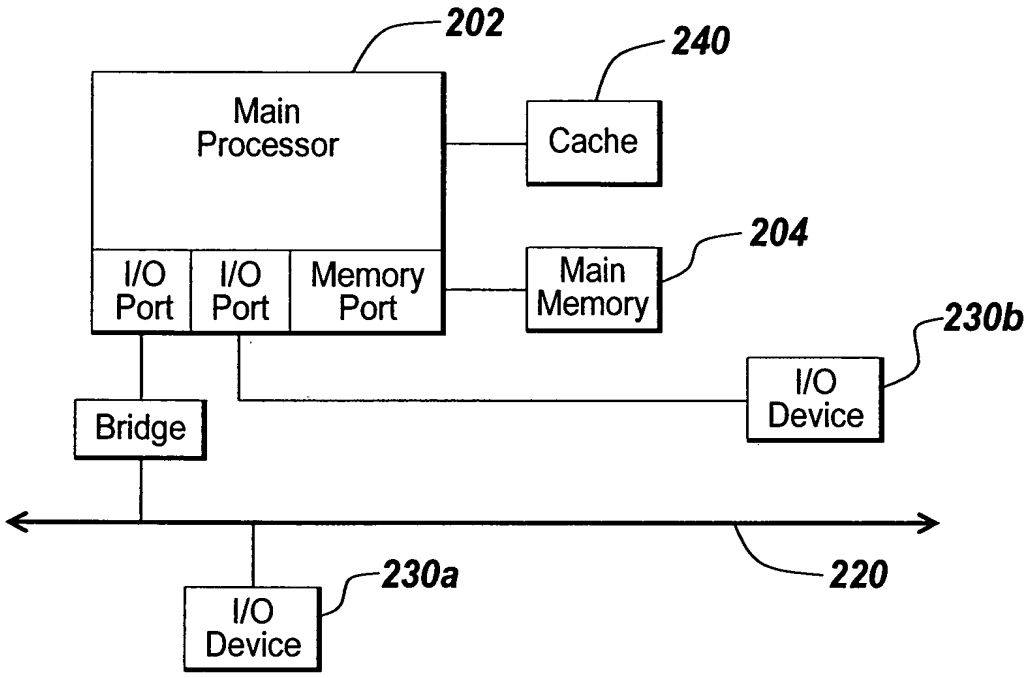
202
240
Main Processor
Cache
I/O Port
I/O Port
Memory Port
Main Memory
204
230b
I/O Device
Bridge
220
230a
I/O Device

Fig. 2B

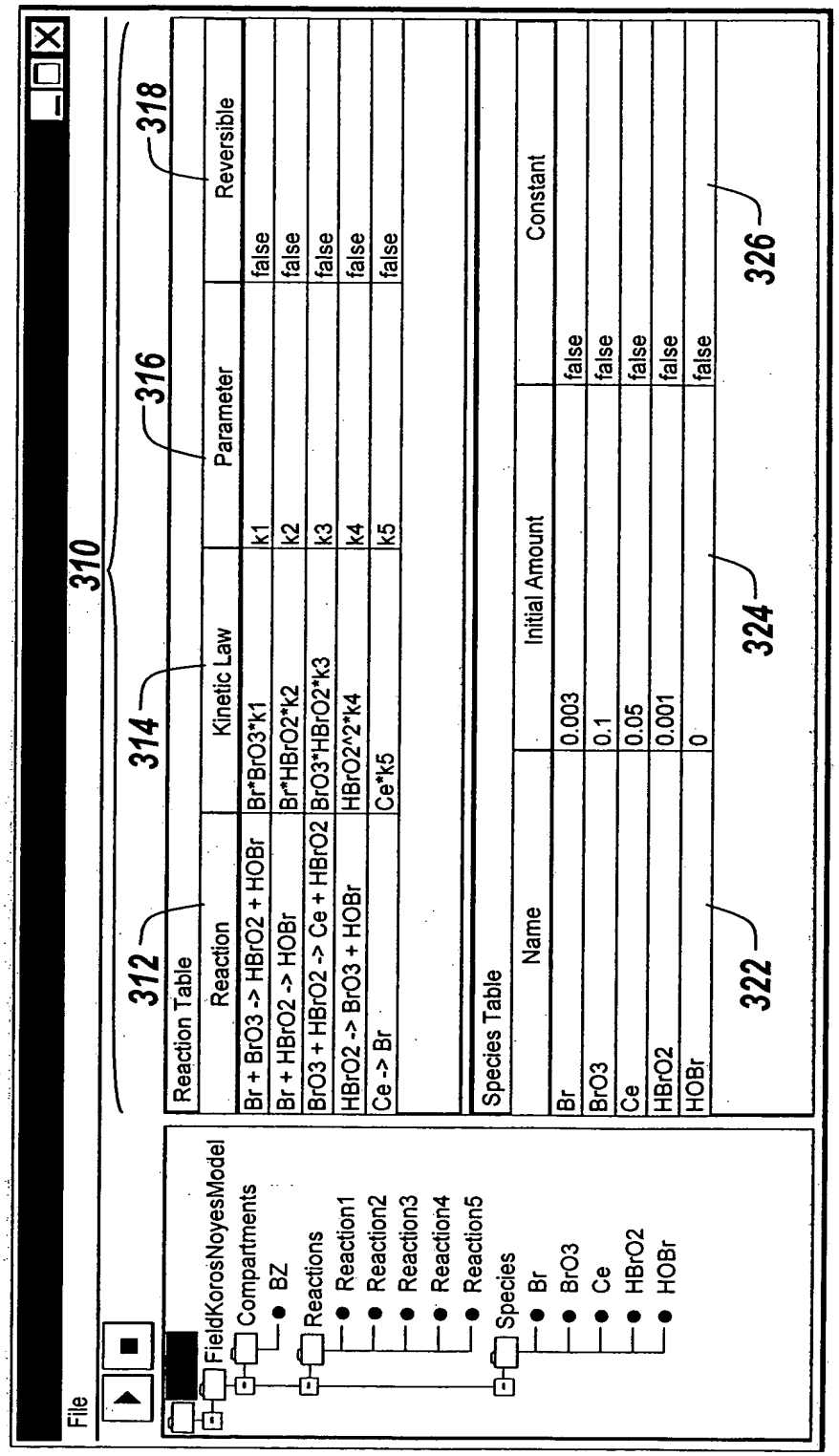
300
File
FieldKorosNoyesModel
Compartments
BZ
Reactions
Reaction1
Reaction2
Reaction3
Reaction4
Reaction5
Species
Br
BrO3
Ce
HBrO2
HOBr
302
310
312
314
316
318
320
322
324
326
Reaction Table
Reaction
Kinetic Law
Parameter
Reversible
Br + BrO3 -> HBrO2 + HOBr
Br*BrO3*k1
k1
false
Br + HBrO2 -> HOBr
Br*HBrO2*k2
k2
false
BrO3 + HBrO2 -> Ce + HBrO2
BrO3*HBrO2*k3
k3
false
HBrO2 -> BrO3 + HOBr
HBrO2^2*k4
k4
false
Ce -> Br
Ce*k5
k5
false
Species Table
Name
Initial Amount
Constant
Br
0.003
false
BrO3
0.1
false
Ce
0.05
false
HBrO2
0.001
false
HOBr
0
false

Fig. 3A

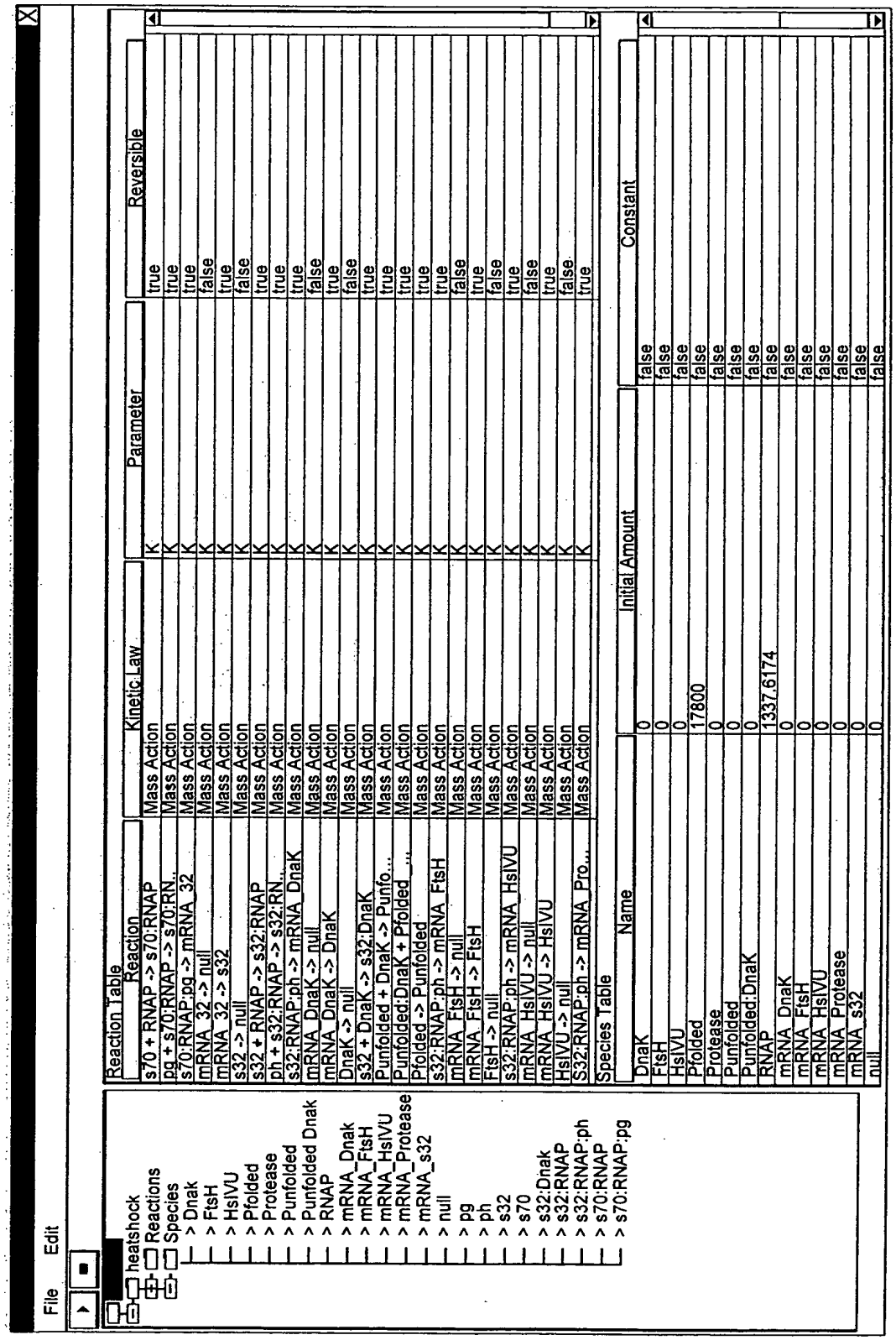
File
Edit
heatshock
Reactions
Species
> Dnak
> FtsH
> HslVU
> Pfolded
> Protease
> Punfolded
> Punfolded Dnak
> RNAP
> mRNA_Dnak
> mRNA_FtsH
> mRNA_HslVU
> mRNA_Protease
> mRNA_s32
> null
> pg
> ph
> s32
> s70
> s32:Dnak
> s32:RNAP
> s32:RNAP:ph
> s70:RNAP
> s70:RNAP:pg
Reaction Table
Reaction
Kinetic Law
Parameter
Reversible
s70 + RNAP -> s70:RNAP
Mass Action
K
true
pg + s70:RNAP -> s70:RN...
s70:RNAP:pg -> mRNA_32
mRNA_32 -> null
mRNA_32 -> s32
s32 -> null
s32 + RNAP -> s32:RNAP
ph + s32:RNAP -> s32:RN...
s32:RNAP:ph -> mRNA_DnaK
mRNA_DnaK -> null
mRNA_DnaK -> DnaK
DnaK -> null
s32 + DnaK -> s32:DnaK
Punfolded + DnaK -> Punfo...
Punfolded:DnaK + Pfolded ...
Pfolded -> Punfolded
s32:RNAP:ph -> mRNA_FtsH
mRNA_FtsH -> null
mRNA_FtsH -> FtsH
FtsH -> null
s32:RNAP:ph -> mRNA_HslVU
mRNA_HslVU -> null
mRNA_HslVU -> HslVU
HslVU -> null
S32:RNAP:ph -> mRNA_Pro...
Species Table
Name
Initial Amount
Constant
DnaK
0
false
FtsH
HslVU
Pfolded
17800
Protease
Punfolded
Punfolded:DnaK
RNAP
1337.6174
mRNA_DnaK
mRNA_FtsH
mRNA_HslVU
mRNA_Protease
mRNA_s32
null

Fig. 3B

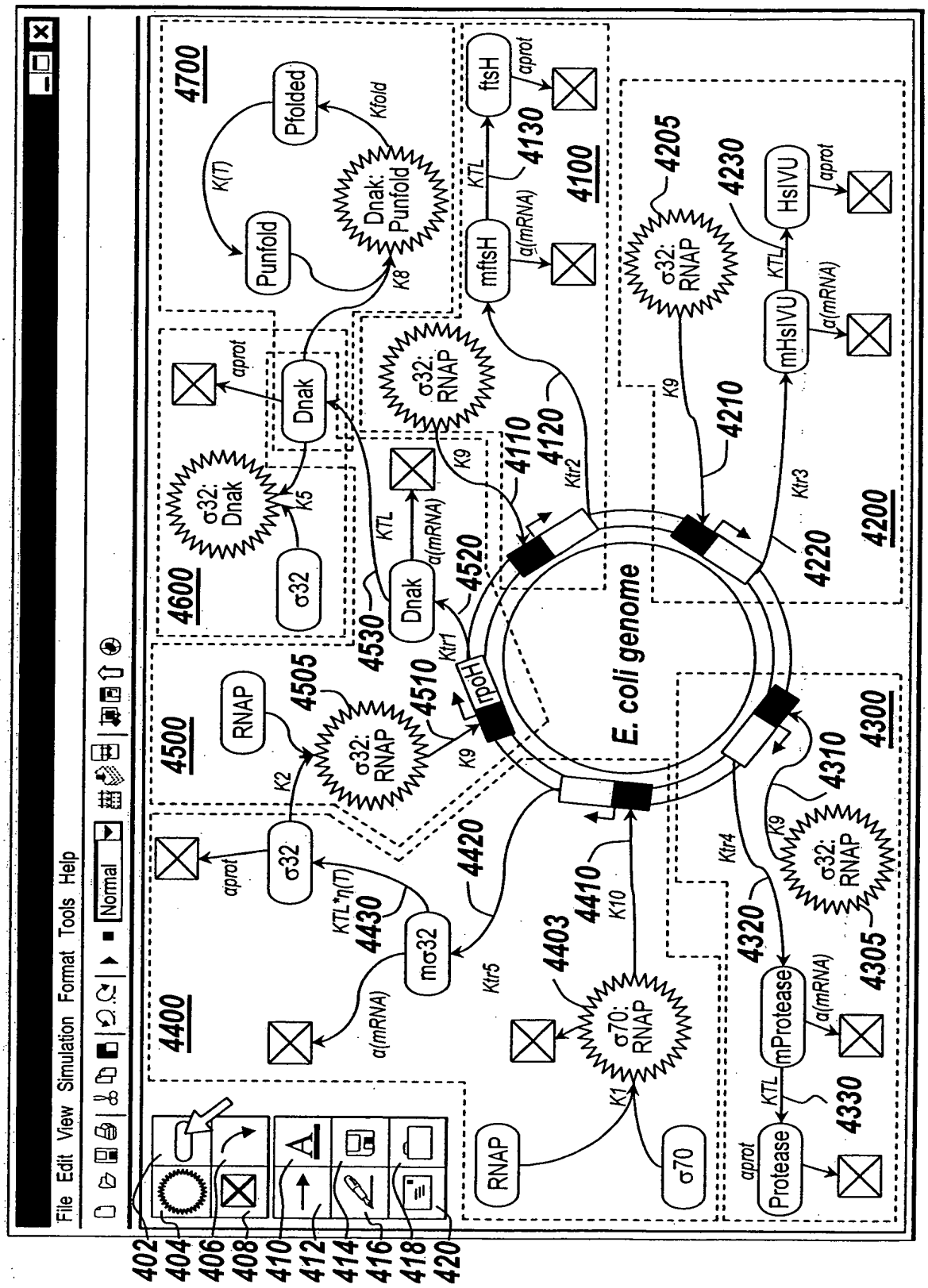
File Edit View Simulation Format Tools Help
Normal
E. coli genome
4700
Pfolded
Kfold
K(T)
Punfold
Dnak: Punfold
K8
4600
σ32: Dnak
K5
σ32
Dnak
aprot
σ32: RNAP
4100
ftsH
4130
mftsH
α(mRNA)
KTL
4205
4230
HslVU
mHslVU
4210
K9
4110
4120
Ktr2
Ktr3
4220
4200
4530
4520
Ktr1
4500
RNAP
4505
4510
IpoH
K2
4300
4310
Ktr4
4320
mProtease
4305
4330
Protease
4400
σ32
mσ32
KTL*η(T)
4430
4420
Ktr5
4403
4410
K10
σ70: RNAP
K1
σ70
RNAP
402
404
406
408
410
412
414
416
418
420

Fig. 4

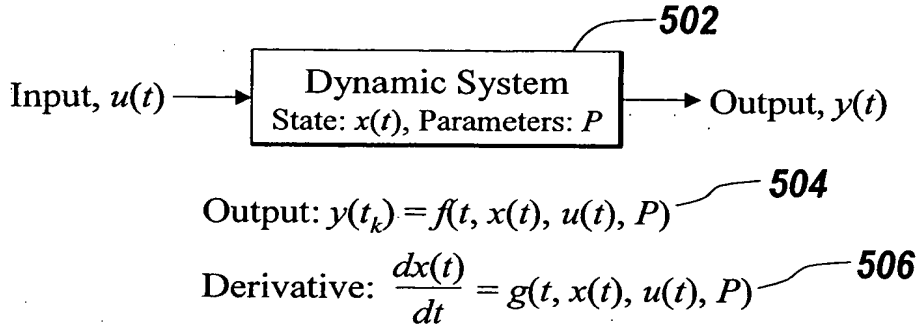

Fig. 5A

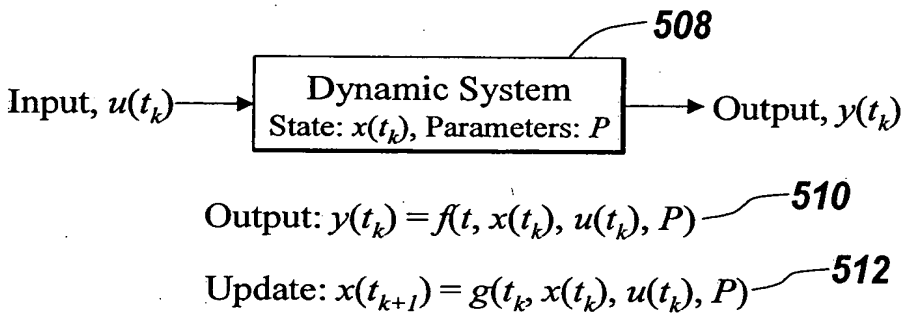

Fig. 5B

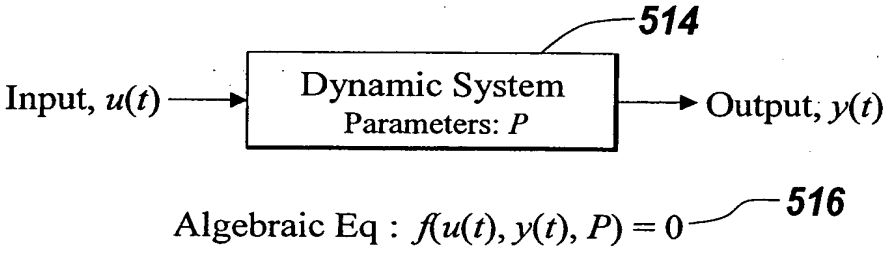

Fig. 5C

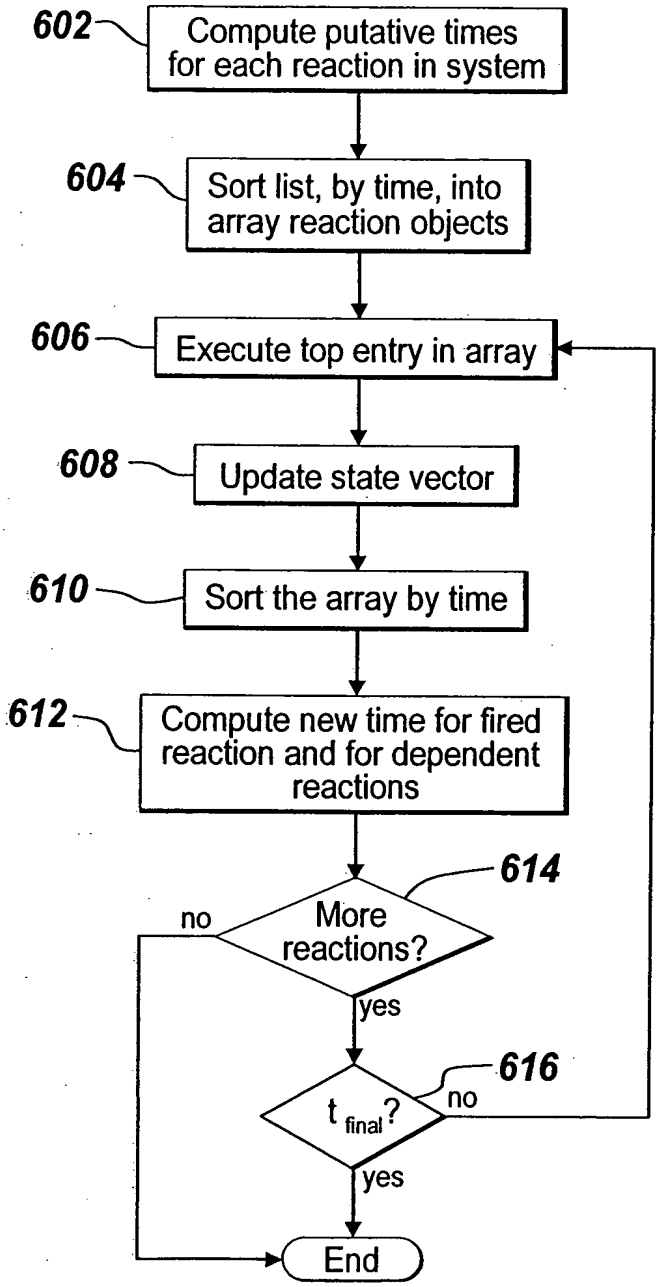
602
Compute putative times for each reaction in system
604
Sort list, by time, into array reaction objects
606
Execute top entry in array
608
Update state vector
610
Sort the array by time
612
Compute new time for fired reaction and for dependent reactions
614
More reactions?
no
yes
616
t_{final}?
no
yes
End

Fig. 6

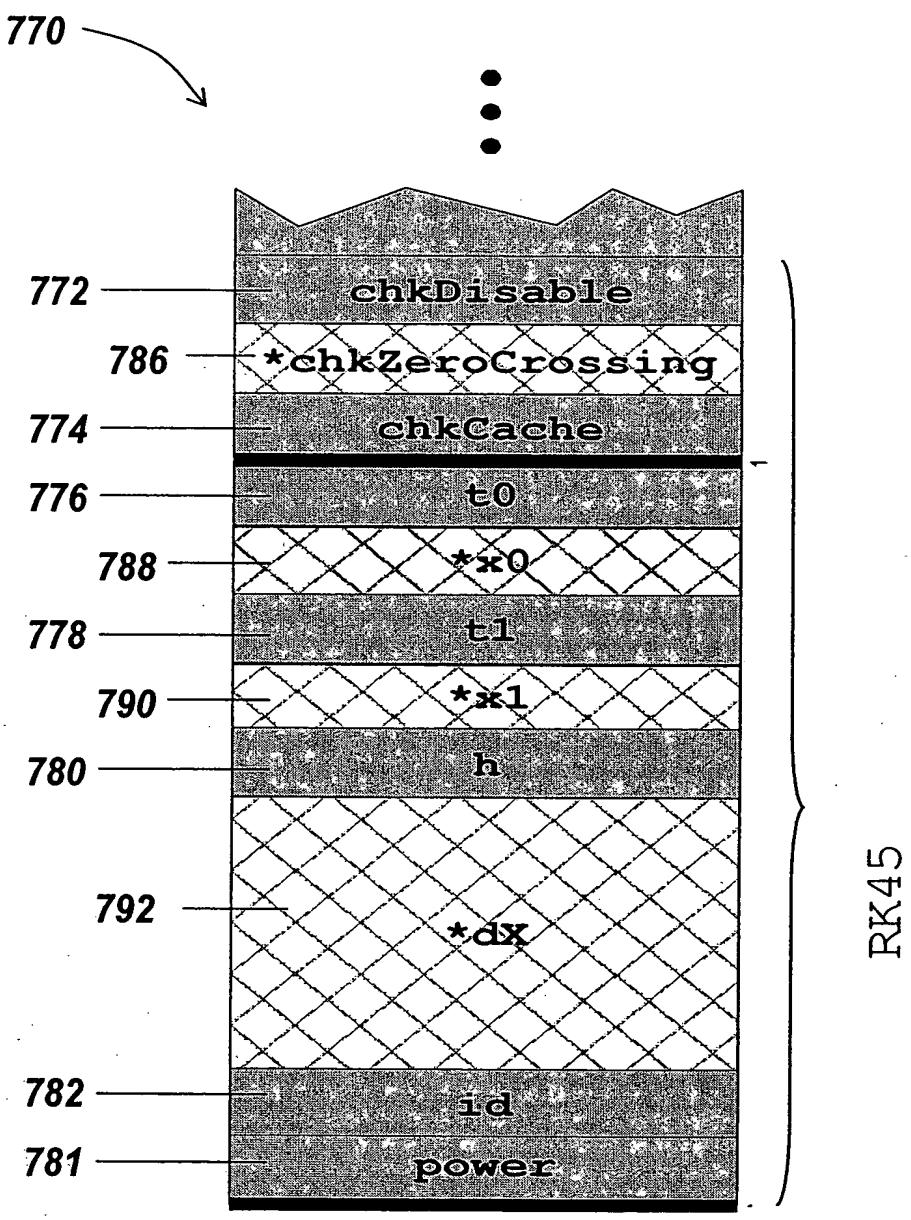
770
772
786
774
776
788
778
790
780
792
782
781
chkDisable
*chkZeroCrossing
chkCache
t0
*x0
t1
*x1
h
*dx
id
power
1
RK45

Fig. 7

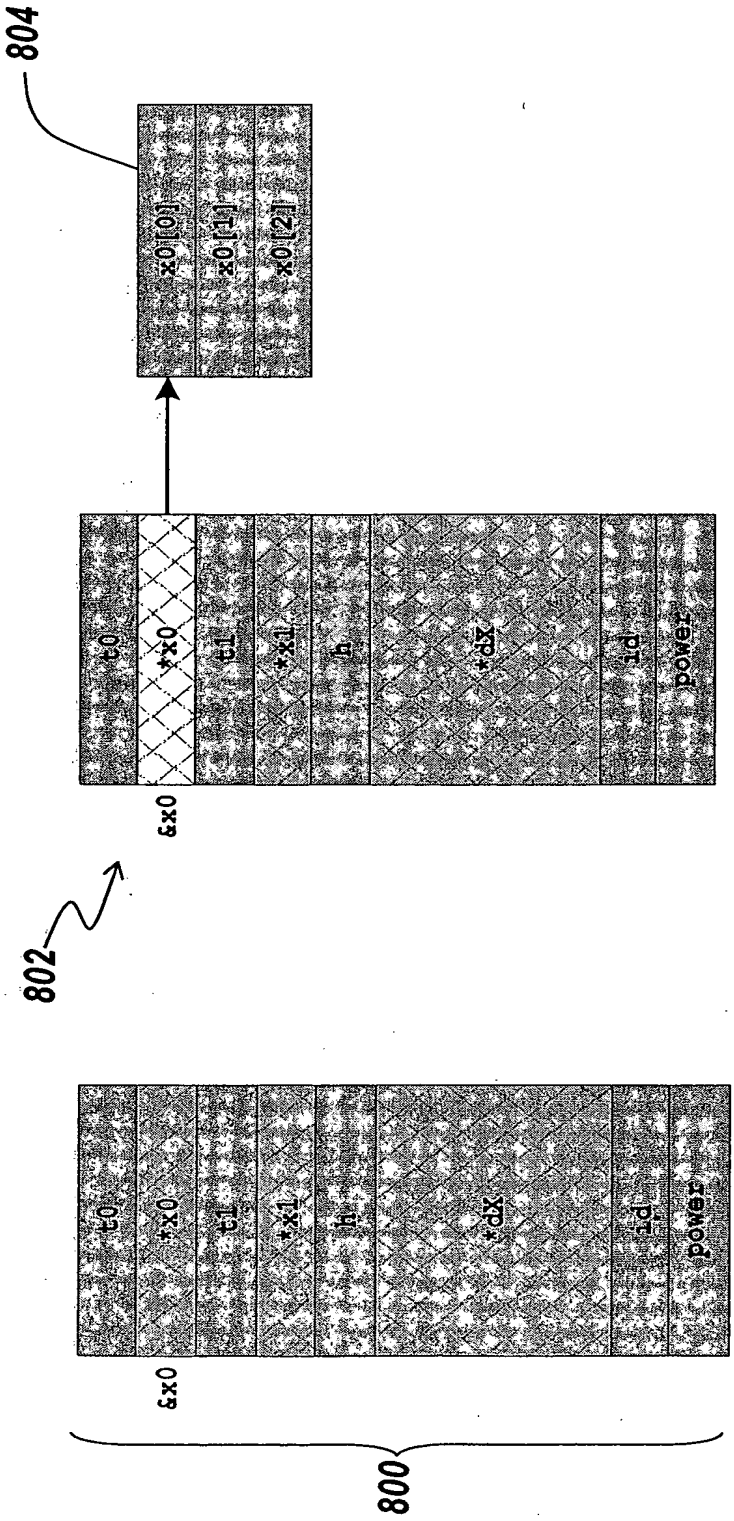
804
x0[0]
x0[1]
x0[2]
t0
*x0
t1
*x1
h
*dx
td
power
&x0
802
t0
*x0
t1
*x1
h
*dx
td
power
&x0
800

Fig. 8B

Fig. 8A

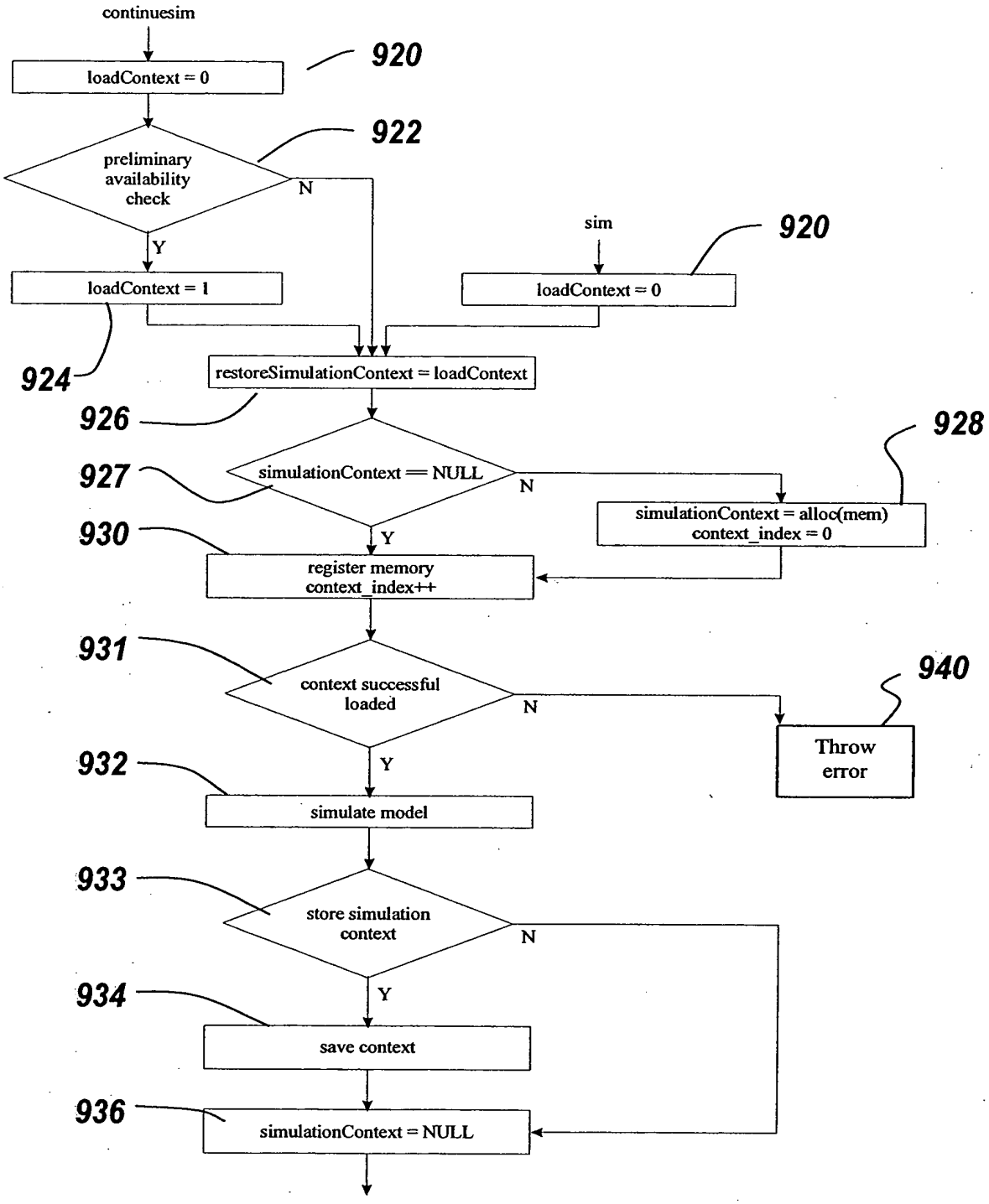
continuesim
loadContext = 0
920
preliminary availability check
922
N
Y
loadContext = 1
sim
920
loadContext = 0
924
restoreSimulationContext = loadContext
926
928
927
simulationContext == NULL
N
simulationContext = alloc(mem)
context_index = 0
930
Y
register memory
context_index++
931
940
context successful loaded
N
Throw error
932
Y
simulate model
933
store simulation context
N
934
Y
save context
936
simulationContext = NULL

Fig. 9